



Draper Aden Associates
Engineering • Surveying • Environmental Services

MEMORANDUM

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TO: Mr. Phil Peet
Potomac Landfill, Inc.

FROM: Leonard 'Rip' Ford, Jr., PhD, PG
Environmental Services Division

DATE: 07-29-15

SUBJECT: **Potomac CDD Landfill**
Assessment of Water Quality

DEQ Permit No. 441
DAA Project No. 20098-175

As requested, Draper Aden Associates (DAA) has reviewed the available information concerning water quality at Potomac Landfill, Inc. The purpose of this correspondence is to summarize the findings of our review. We note that our assessment is based upon information that resides in the public domain, at the Virginia Department of Environmental Quality (Northern Regional Office).

Potomac Landfill has been monitoring the quality of groundwater at the facility, in accordance with *Virginia Solid Waste Management Regulations*, since July, 1997 (if not earlier). In a letter dated October 26, 2000, DEQ initially approved Groundwater Protection Standards for the facility. The results of chemical analyses of groundwater are compared to current Groundwater Protection Standards during each groundwater sampling event.

A review of the results of groundwater sampling and chemical analysis obtained since 1997 (attached) indicates that *five* presumably man-made *organic compounds* have been reliably detected in groundwater samples obtained from one or more of the *eight monitoring wells* that are located around the perimeter of the landfill:

- *Benzene*. The laboratory has regularly detected trace levels of benzene in well MW-05 since 2008; however, the concentrations have been so low that the laboratory was not able to accurately quantify the concentrations (less than one part per billion). Concentrations of benzene have *never* exceeded the drinking water standard established by EPA (five parts per billion).
- *Chloroethane*. The laboratory detected trace levels of chloroethane in well MW-05 between 2008 and 2010; however, the concentrations were so low that the laboratory was not able to accurately quantify the concentrations (less than one part per billion). Concentrations of

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chloroethane have *never* exceeded the risk-based standard established by Virginia DEQ (currently set at 21,000 parts per billion).

- *1,1-dichloroethane*. The laboratory has regularly detected low levels of 1,1-dichloroethane in well MW-05 since 1997. Since 2010, however, the concentrations have been so low that the laboratory was not able to accurately quantify the concentrations (less than one part per billion). Concentrations of 1,1-dichloroethane have not exceeded the risk-based standard established by Virginia DEQ since August, 2003 (nearly twelve years ago) (currently set at 2.4 parts per billion).
- *1,1,1-trichloroethane*. The laboratory regularly detected low levels of 1,1,1-trichloroethane in well MW-05 between 1997 and 2003. Since 2003, the laboratory has detected 1,1,1-trichloroethane in well MW-05 on two occasions; however, the concentrations were so low that the laboratory was not able to accurately quantify the concentrations. Concentrations of 1,1,1-trichloroethane have *never* exceeded the drinking water standard established by EPA (200 parts per billion).
- *trichlorofluoromethane* (Freon). The laboratory sporadically detected low levels of trichlorofluoromethane in well MW-05 between 1997 and 2003. Since 2003, the laboratory detected trichlorofluoromethane on three occasions (during 2008 and 2009); however, the concentrations were so low that the laboratory was not able to accurately quantify the concentrations (less than one part per billion). Concentrations of trichlorofluoromethane have *never* exceeded the risk-based standard established by Virginia DEQ (currently set at 1,100 parts per billion).

In summary, *five* presumably man-made *organic constituents* have been reliably detected in *one* groundwater monitoring well (MW-05) at the landfill. Only *one* organic constituent (1,1-dichloroethane) has *ever* exceeded its standard, and that one constituent has *not* exceeded its standard since 2003. We conclude that groundwater at Potomac Landfill does *not* represent a significant risk to human health, either at the landfill or at any adjacent properties.

We note that *Virginia Solid Waste Management Regulations* do not require sampling and chemical analysis of *streams*. Perennial (regularly flowing) streams are replenished by groundwater that seeps into the stream, along its banks; therefore, if the groundwater flowing beneath a landfill is not contaminated, then the water in the stream will not be contaminated by the discharge of that groundwater into the stream.

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If you have any questions, please contact me by e-mail (rford@daa.com) or telephone (804.264.2228).

Attachments: tables (history of chemical analyses of groundwater - organic compounds)

Substituted Anilines

[illegible]

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

[illegible]

ORIGINAL CONSULTANTS

CONSTITUENT	DATE	INW421	INW422	INW423	INW424	INW425	INW426	INW427	INW428	LOQ	LOQ	QADDC
Trichloroethene INCL = * LC-MS = SCL 79AC = 1032000 (4-11) SCL = 270 (01-27-20) SCL = 1113 (02-01-11) 0810096 0820088 SCL = 1113 (05-05-11) SCL = 1103 (07-01-13) 1119098 0225099 0505099 0812099 1117099 0302000 0526000 0810000 1010000 0215001 0825001 1121001 0227002 0918002 0211003 0805003 0414004 1012004 0419005 1017005 0412006 1005006 0409007 1022007 0417008 1014008 0403009 1008009 0405010 1013010 0413011 1108011 0522012 1129012 0520013 1122013 0514014 1113014	07/29/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/09/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/04/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/19/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	03/18/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	08/10/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	08/20/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/19/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	02/25/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	05/05/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	08/12/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/17/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	03/20/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	05/26/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	08/10/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/19/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	02/15/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	05/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/21/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
02/27/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
09/18/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
02/11/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
08/05/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
04/14/04	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
10/12/04	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81
04/19/05	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81
10/17/05	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81
04/12/06	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81
10/05/06	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
04/09/07	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57
10/22/07	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57
04/17/08	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10/14/08	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
04/03/09	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10/08/09	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
04/05/10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10/13/10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
04/13/11	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
11/08/11	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
05/22/12	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
11/29/12	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
05/20/13	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
11/22/13	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
05/14/14	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
11/13/14	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

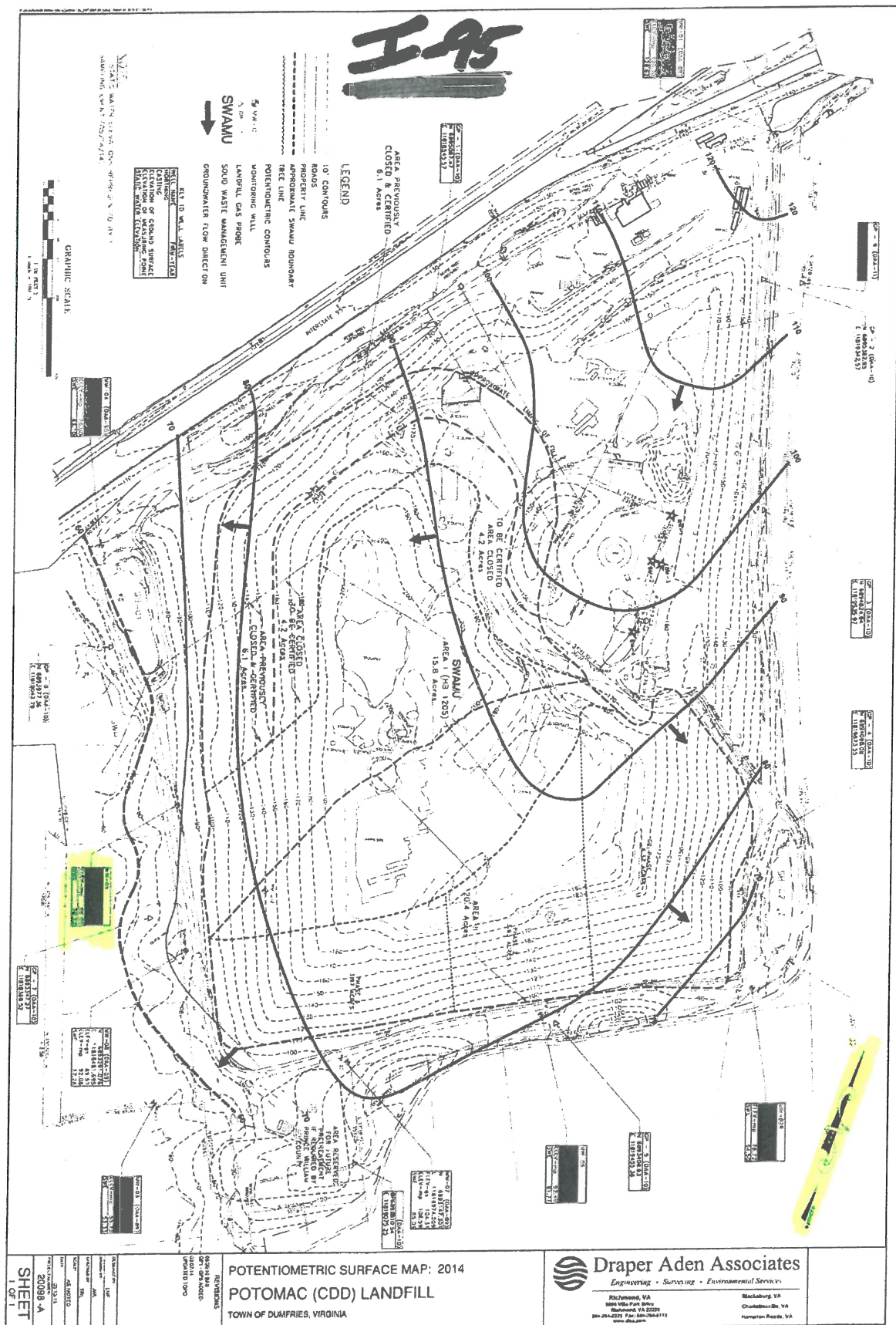
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2.75, 10/20/2004, 11-12-04

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Response to Question #4:

Hydrogen Sulfide (H₂S) gas gives off a “rotten egg” odor which is detectable by nose at concentrations of about 10 parts per billion (ppb) (0.01 parts per million (ppm)). Aside from the smell, literature indicates that potential health risks do result from exposure to H₂S gas. The health effects can vary depending on the level and duration of exposure.

Acute exposure symptoms include:

L O W	0 - 10 ppm	Irritation of the eyes, nose and throat
M O D	10 - 50 ppm	Headache Dizziness Nausea and vomiting Coughing and breathing difficulty
H I G H	50 - 200 ppm	Severe respiratory tract irritation Eye irritation / acute conjunctivitis Shock Convulsions Coma Death in severe cases

Chronic Health Effects

Hydrogen sulfide does not accumulate in the body. Nevertheless, repeated or prolonged exposure has been reported to cause low blood pressure, headache, and nausea, loss of appetite, weight loss, ataxia, eye-membrane inflammation, and chronic cough. Neurologic symptoms, including psychological disorders, have been associated with chronic exposure. Chronic exposure may be more serious for children because of their potential longer latency period.

Hydrogen sulfide has not been shown to cause cancer in humans, and its possible ability to cause cancer in animals has not been studied thoroughly. The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified hydrogen sulfide as to its carcinogenicity. The EPA has determined that data for hydrogen sulfide are inadequate for carcinogenic assessments.

For reference, Potomac Landfill is required by their Odor Monitoring Plan that in the event that onsite monitoring at the facility boundary detects hydrogen sulfide concentrations above 0.010 ppm, a local citizen complaint is received or upon notification from the Department or the Town of Dumfries, the facility shall investigate and verify the presence of H₂S offsite and determine if the landfill is the source. If the landfill is the source of the odors, then Potomac shall apply odor controlling chemistry to or cover the areas determined to be odor sources.

Potomac shall document the investigation and its outcome and submit a written report (email is acceptable) to the Department and the Town of Dumfries within three (3) business days of concluding the investigation.

References

Hydrogen Sulfide – ToxFAQs, Agency for Toxic Substances and Disease Registry

H₂S Safety Fact sheet, Safety Directory.com

Medical Management Guidelines for Hydrogen Sulfide, Agency for Toxic Substances and Disease Registry

Response to Question #5

Hydrogen Sulfide (H₂S) gas gives off a “rotten egg” odor which is detectable by nose at concentrations of about 10 parts per billion (ppb) (0.01 parts per million (ppm)). Aside from the smell, literature indicates that potential health risks do result from exposure to H₂S gas. The health effects can vary depending on the level and duration of exposure.

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Medical Management Guidelines for Hydrogen Sulfide, Agency for Toxic Substances and Disease Registry

Estimated Host Fee Revenue If New Landfill Agreement Is Approved

Year	Projected Amount	Potential Tax Rate	Tax On \$100,000	Tax On \$150,000	Tax On \$200,000	Tax On \$250,000
2015	XXXXX	0.1889	\$189.00	\$283.35	\$379.80	\$472.25
2016	\$72,551	0.1717	\$171.70	\$257.55	\$343.40	\$429.25
2017	\$96,078	0.1653	\$165.30	\$247.95	\$330.60	\$413.25
2018	\$142,942	0.153	\$153.00	\$229.50	\$306.00	\$382.50
2019	\$182,466	0.1441	\$144.10	\$216.15	\$288.20	\$360.25
2020	\$184,290	0.1436	\$143.60	\$215.40	\$287.20	\$359.00